

ABSTRACT

A metal chalcogenide composite nano-particle comprising a metal capable of forming p-type semiconducting chalcogenide nano-particles and a metal capable of forming n-type semiconducting chalcogenide nano-particles, wherein at least one of the metal chalcogenides has a band-gap between 1.0 and 2.9 eV and the concentration of the metal capable of forming p-type semiconducting chalcogenide nano-particles is at least 5 atomic percent of the metal and is less than 50 atomic percent of the metal; a dispersion thereof; a layer comprising the nano-particles; and a photovoltaic device comprising the layer.